

Asexual reproduction

Adapted From Wikipedia, the free encyclopedia

Asexual reproduction is reproduction which does not involve [fertilization](#) (sperm and egg coming together). Only one parent is involved in asexual reproduction. Asexual reproduction is the primary form of reproduction for single-celled organisms such as [bacteria](#), and [protists](#). Many [plants](#) and [fungi](#) reproduce asexually as well. There are even some species of [animals](#) that can reproduce asexually, though not many. Perhaps the biggest advantage of asexual reproduction is the possibility for rapid population growth. This comes at an expense though. Organisms that reproduce asexually have much less genetic diversity—virtually all the offspring are clones of their parents. Having diversity within the species allows creatures to adapt better to changing environments, thus making their overall survival rates much higher. For this reason, asexual organisms may not be as good at surviving as sexual organisms. When it's all said and done, sexual reproduction is a much more successful way to reproduce a species, but asexual reproduction certainly has its place on our planet.

Costs and benefits

Because asexual reproduction does not require the formation of [gametes](#) (egg and sperm) and bringing them together for [fertilization](#), it occurs *MUCH FASTER* than sexual reproduction. It also requires less energy and nutritional resources because you don't have to make the eggs or sperm or go out looking for a mate. Asexual lineages can increase their numbers rapidly because ALL MEMBERS can make offspring. In sexual populations with two sexes, some of the individuals are male and cannot themselves produce offspring. This means that an asexual lineage will have roughly double the rate of population growth when compared with a sexual population half composed of males. In situations where the population density is low, the chance of finding a mate is also low. So another advantage of asexual reproduction is that you can reproduce without a partner (some desert lizards do this). Or perhaps a species is on an isolated habitat such as an oceanic island. Sometimes a single (female) member of the species is enough to start an entire population.

Unfortunately, asexual reproduction reduces [genetic variation](#) within a population because offspring are genetic clones of the parent. Many forms of asexual reproduction produce an exact [replica](#) of the parent. This genetic similarity may be beneficial if the organism is well-suited to its environment, but if a new predator or [pathogen](#) appears and the [organism](#) is particularly defenseless against it, an asexual lineage is more likely to be completely wiped out by it. Imagine that—just one virus, one infection, one drastic climate change, one food source change, one tiny alteration in the environment could destroy the whole population.

In contrast, a lineage that reproduces sexually has a higher chance that at least SOME of the creatures might survive through disease or disaster. This is because [sexual reproduction](#) produces NEW ORGANISMS with different DNA. So variation is good because it might give a survival advantage. The only way asexual creatures can adapt to changing environments is through spontaneous beneficial mutations, and these don't happen often.

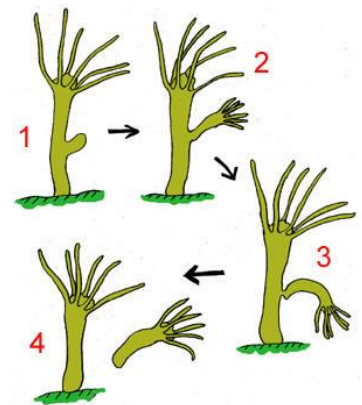
Types of asexual reproduction

Binary fission

Many single-celled organisms (unicellular), such as archaea, bacteria, and protists, reproduce asexually through [binary fission](#). This simply means the cells split in half and two perfect replicas are created.

Budding

Some cells split via [budding](#) (for example baker's yeast), resulting in a 'mother' and 'daughter' cell. The offspring organism is smaller than the parent. Budding is also



known on a multicellular level; an animal example is the hydra, which reproduces by budding. The buds grow into fully matured individuals which eventually break away from the parent organism.

Vegetative reproduction

Vegetative reproduction is a type of asexual reproduction found in plants. Examples of vegetative reproduction include the formation of miniaturized plants called plantlets on specialized leaves (for example in kalanchoe), Some produce new plants out of rhizomes or stolon (for example in strawberry). Other plants reproduce by forming bulbs or tubers (for example tulip bulbs and dahlia tubers). Some plants produce adventitious shoots and suckers that form along their lateral roots. Plants that reproduce vegetatively may form a clonal colony, where all the individuals are clones, and the clones may cover a large area.

Fragmentation

Fragmentation is a form of asexual reproduction where a new organism grows from a fragment of the parent. Each fragment develops into a mature, fully grown individual. Fragmentation is seen in many organisms such as animals (some annelid worms and sea stars), fungi, and plants.

Parthenogenesis

Parthenogenesis is a process in which an unfertilized egg develops into a new individual. In other words, the male is not needed. Parthenogenesis occurs naturally in many plants, invertebrates (e.g. water fleas, aphids, stick insects, some ants, bees and parasitic wasps), and vertebrates (e.g. some reptiles, amphibians, fish, and very rarely birds).

Alternation between sexual and asexual reproduction

Some species alternate between the sexual and asexual strategies, an ability known as heterogamy, depending on conditions. For example, the freshwater crustacean *Daphnia* reproduces by parthenogenesis in the spring to rapidly populate ponds, then switches to sexual reproduction as the intensity of competition and predation increases. Many protists and fungi alternate between sexual and asexual reproduction. For example, the slime mold *Dictyostelium* undergoes binary fission as single-celled amoebae under favorable conditions. However, when conditions turn unfavorable, the cells aggregate and switch to sexual reproduction leading to the formation of spores. Many algae similarly switch between sexual and asexual reproduction. Asexual reproduction is far less complicated than sexual reproduction. In sexual reproduction one must find a mate.

Examples in animals

A number of invertebrates and some less advanced vertebrates are known to alternate between sexual and asexual reproduction, or be exclusively asexual. Alternation is observed in a few types of insects, such as aphids (which can produce eggs that have not gone through meiosis, essentially cloning themselves) and the cape bee. A few species of amphibians and reptiles have the same ability. A very unusual case among more advanced vertebrates is the female turkey's ability to produce fertile eggs in the absence of a male. The eggs result in often sickly, and nearly always male turkeys.

There are examples of parthenogenesis in the hammerhead shark and the blacktip shark. In both cases, the sharks had reached sexual maturity in captivity in the absence of males, and in both cases the offspring were shown to be genetically identical to the mothers.